

NOTES ON THE APHODIINAE OF AUSTRALIA (COLEOPTERA, SCARABAEIDAE).

THE APHODIUS TASMANIAE, HOWITTI, YORKENSIS, ANDERSONI COMPLEX.

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(Communicated by P. B. Carne.)

(Ten Text-figures.)

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INTRODUCTION.

The species *tasmaniae* Hope and *howitti* Hope of the genus *Aphodius*, have long been the cause of considerable controversy. The species *andersoni* Blackburn and *yorkensis* Blackburn have not previously been carefully considered with the first two species, as they are (if valid species) relatively rare and of no known economic importance. What we have long accepted as *A. howitti* is a major pasture pest in Victoria, South Australia, and parts of New South Wales, and it is this fact which now makes it necessary that the systematic status of this and other closely allied species should be carefully examined.

This, the first of what is hoped to be a series of papers on the Aphodiinae, is mainly a collection of extracts from official and personal files, and published descriptions and opinions. Little personal research has been done by the writer, and the only really original contribution is a series of line drawings.

APHODIUS HOWITTI Hope.

Proc. Ent. Soc. Lond., 1846, p. 147.*tasmaniae* Hope, *Proc. Ent. Soc. Lond.*, 1846, p. 147.*australasiae* Blanchard, *Voy. Pole Sud* 4, 1853, p. 101.*andersoni* Blackburn, *Proc. Roy. Soc. Vic.*, xvii, Pt. 1, 1904, p. 154.*longitarsis* Redtenbacher, *Reise der . . . Fregatte Novara um die Erde*, 1867, p. 58.

This is a rather variable species as regards structure, colour, and size. Its distribution is wide (from Eyre Peninsula through south-eastern South Australia and Victoria to south-eastern New South Wales), and it is often extremely common.

The following description is greatly condensed, as detailed descriptions have frequently been published in the past.

Colour normally black, but sometimes brownish or, rarely, reddish. Ventral surface and coxae brownish. Lateral and basal borders of pronotum usually reddish brown, anterior angles testaceous. Entire surface nitid.

Head broad and finely punctured, clypeal margin narrowly reflexed, anterior clypeal margin evenly curved, or straight and somewhat angled laterally. Medially on the frons, behind the clypeal suture, is a distinct but small tubercle, while laterally, in front of the eyes and on the suture, are raised areas. Eyes black, not prominent. Antennae rather small, and not highly distinctive.

Pronotum glabrous except for elongate marginal bristles; evenly convex, narrowly margined, finely punctured, and with distinct though not prominent anterior angles. Posterior angles almost completely rounded. The pronotum of the male is much larger and somewhat more convex than in the female, although in both sexes (particularly males) size is very variable.

Elytra strongly convex, elongate, and with nine sharply impressed, narrow striae on each elytron; inter-strial spaces strongly convex, with a rather irregular row of punctures on either side, each puncture bearing a minute hair.

Fore-tibiae strongly toothed, with the teeth more slender in the female. Spaces between teeth crenulate.

Length, 8.5–12 mm.; breadth, 3.8–5.3 mm.

Explanation of Synonymy, etc.

Harold (*Berl. Zeit.*, 1859) appears to have been the first to doubt the validity of Hope's species *howitti*, and at that time reported the two species *tasmaniae* and *howitti* to be identical. In 1861 (*loc. cit.*) he reversed his opinion as a result of an examination of further material. An account of this is to be found in Blackburn's paper (*Proc. Roy. Soc. Vic.*, 1904, pp. 153–4). However, in this paper Blackburn makes an error in saying that *tasmaniae* was described a year later than *howitti*. Actually, *howitti* was described on the same page as *tasmaniae*, but below it. Blackburn considers that Harold's reversal of opinion was due to the fact that in the first case he was examining specimens of one sex, and in the second, specimens of opposite sex.

Junk (*Cat. Coleopt.*, 1910) does not consider *howitti* and *tasmaniae* as being synonymous, but places *australasiae* Blanch. as a synonym of *howitti*, and *longitarsis* Redt. as a synonym of *tasmaniae*. *Andersoni* Blackb. is left valid, and a second species, *australasiae* (Boheman, *Res. Eugen.*, 1858), is also left. This last species should be renamed (Blanchard's species had priority), but whether or not it is synonymous within this group is not herein determined. However, Blackburn apparently considers it to be close to *A. frenchi* Blackb., which relationship would exclude it from the group under discussion.

Schmidt (*Genera Insectorum*) considers the two species *howitti* and *tasmaniae* to be both valid.

Resulting from correspondence with Miss W. Kent Hughes (Division of Entomology, C.S.I.R.O., Canberra) in 1931, Mr. G. J. Arrow, of the British Museum, examined types of *andersoni*, *howitti* and *tasmaniae*, and concluded that the last two species were the same, and that a specimen sent by Miss Hughes, named *howitti* by Mr. A. Lea, agreed with the type of *andersoni*. Miss Hughes, in her reply, writes:

"You mention in your letter that *A. andersoni* Blackb. had smooth elytral intervals and more punctured head and thorax. Some of my specimens agree with *A. andersoni* Blackburn, as regards the puncturation of the head and thorax, but seem to have the elytral structure of *A. howitti* Hope. Would it be possible for these all to belong to one variable species, or for one or other of them to be a variety or sub-species? When looking through the series one seems to get a gradual change from one to the other."

In 1939, correspondence was conducted between Mr. A. L. Tonnoir, Division of Economic Entomology, Canberra, and Mr. H. J. Carter on the subject. In his first letter Mr. Tonnoir mentions the tubercles on the head of *howitti*, stating that his information was obtained from J. W. Evans, who obtained it from Renaud Paulian of Paris. Carter's final opinion was that the three species *howitti*, *tasmaniae*, and *andersoni*, were the same, and that all should be called *A. tasmaniae* Hope.

In the *Tasmanian Journal of Agriculture* (Feb. 1), 1941, p. 29, J. W. Evans places on record his findings resultant on correspondence with M. Paulian of the Paris Natural History Museum. The presence of the three tubercles on the head (*vid. sup.*) are mentioned and illustrated, and Evans also considers the anterior outline of the head (clypeus) to be distinctive. He also makes an interesting and very important statement as follows:

"With regard to their distribution, *A. tasmaniae* occurs in southern Tasmania and has been bred only from larvae collected at Gretna and Huon Island. *A. howitti* has been reared from larvae collected at several places on the north-west coast and Flinders Island, and is the injurious species in Victoria and South Australia, and probably New South Wales." (*Note*.—The present writer has not yet seen specimens of the typical mainland form from Tasmania.)

Finally, type material was again examined at the request of Mr. P. B. Carne of the Division of Entomology, C.S.I.R.O., Canberra. This examination was carried out by Mr.

E. B. Britton of the British Museum, who makes the following observations on the Hope material and Blackburn's type of *andersoni*, in a letter dated 5th June, 1948:

"I am quite certain that they belong to the same species. The only difference is that the type of *tasmaniae* is 10 mm. long while that of *howitti* is only 8 mm. Hope's descriptions differ only in the matter of size and colour.

"The type of *A. andersoni* is in our collections here. The length is 9.5 mm. and colour yellowish brown. The outline of the clypeus differs slightly from that of *tasmaniae* and the tubercles of the frons are less prominent, but I do not hesitate to consider this also synonymous with *howitti*.

"The series of specimens labelled *tasmaniae* in our collections is mixed. The majority of the specimens are the true *howitti* but there are five examples of a species with hairy elytra apparently restricted to Tasmania. This is, I suppose, the species which Blackburn and others have identified as *tasmaniae*.

"There are two other species, *australasiae* Blanchard and *longitarsis* Redt., recorded by Schmidt as synonyms of *howitti* and *tasmaniae* respectively. The descriptions of these species are fairly detailed and yet make no mention of hairs on the elytral intervals. It seems certain that these are *howitti* and not the '*tasmaniae*' of Blackburn. This latter species is, therefore, left in need of a name."

Britton also gives differences of the hind tarsi, sides of pronotum, and posterior pronotal angles, as separating characters for the species *tasmaniae* (= *howitti*, = *andersoni*, etc.) and "*tasmaniae*" as erroneously accepted in Australia.

On Hope's type of *A. howitti*, the label reads "*howettii*". However, as "*howitti*" was employed in Hope's published description, it being stated that the species was named after its collector, a Mr. Howitt, it is safe to assume that the specimen label is incorrect.

In a later letter, dated 6th July, 1948, Britton replies to queries regarding *A. yorkensis*, and gives the results of a comparison between types and specimens of "*howitti*" and "*tasmaniae*" (*howitti* and *pseudotasmaniae* respectively in the nomenclature introduced in this paper). He also examined the genitalia of the two species and declares them to be quite distinct in this regard. All points mentioned in this comparison bear out Britton's earlier observations and conclusions; that is, that the so-called species *andersoni*, *howitti* and *tasmaniae* are actually all *howitti* and that what had previously been considered to be *tasmaniae* is an undescribed species (herein described as *pseudotasmaniae*, n. sp.).

From the above extracts and summaries, it is obvious that Hope's species *tasmaniae* and Blackburn's *andersoni* must be reduced to synonymy under *howitti* Hope. The two species actually occurring, *howitti* and *pseudotasmaniae*, have been carefully examined, and certain characters found to be useful in separating them. Seven males and fifteen females from Tasmania, and eighteen males and sixteen females from the mainland were studied, and the following characters were found to occur:

Tubercles on head.—All specimens from the mainland with the exception of one female from Canberra had well-developed, or at least definite, tubercles. In two Tasmanian males, head tubercles (median in particular) were faintly developed.

Clypeal outline.—This character was found to be extremely variable, and diagnostically useless.

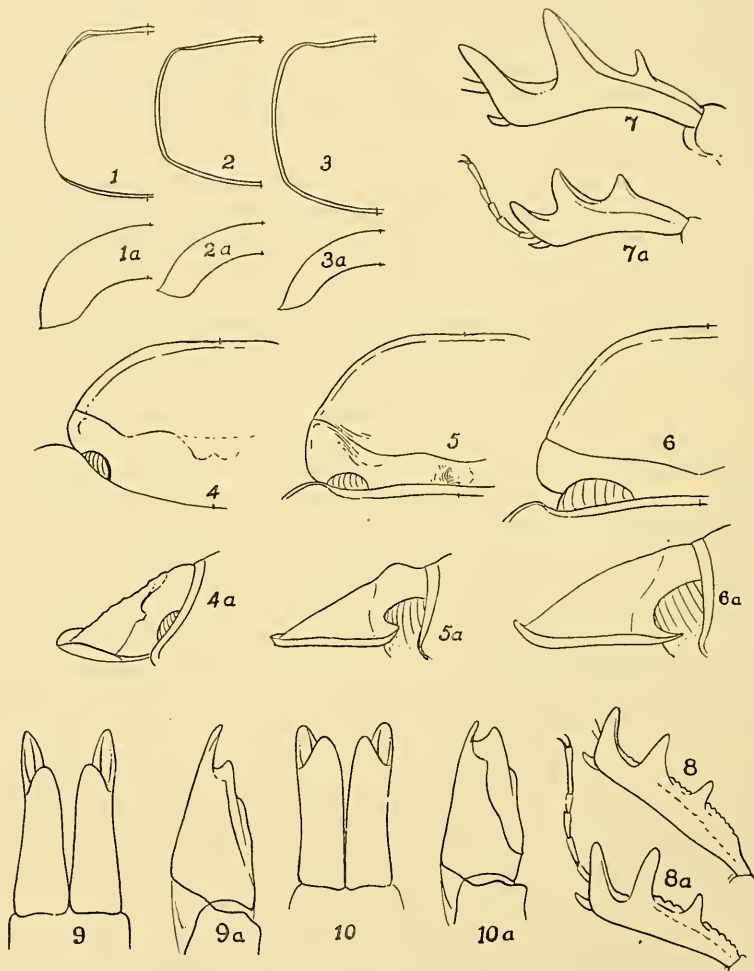
Hairiness of elytra.—Distinctly hairy elytra were present on all males from Tasmania, but on no other specimens.

Genitalia.—From three males from Tasmania and three from the mainland, genitalia were dissected and examined. Constant differences were again found and these are illustrated in Text-figs. 9 and 10. These figures are somewhat idealized to illustrate points of difference, but no actual distortion of proportion occurs. Male genital characters are not suitable for general use on account of the extreme fragility of some parts of the structure, and examination must be made before mounting in any clearing mountant as certain important parts are liable to become practically invisible.

APHODIUS YORKENSIS Blackburn.

Trans. Roy. Soc. S.A., 1892, p. 209.

In characters of colour (rufo-ferrugineous), coarse puncturing of head, truncate clypeus, puncturing of elytra, and proportions of the male pronotum, the pair before me agree very well with Blackburn's description, and the only characters mentioned below are those not mentioned by Blackburn, but which appear to be useful for separation from *howitti* and *pseudotasmaniae*.



Text-figures 1-10.

Figs. 1, 1a.—Pronotum, dorsal and anterior, *A. yorkensis*.

Figs. 2, 2a, 3, 3a.—Pronotum showing range for *howitti* or *pseudotasmaniae*.

Figs. 4, 4a.—Head, *yorkensis*.

Figs. 5, 5a.—Head, *howitti*.

Figs. 6, 6a.—Head, *pseudotasmaniae*.

Figs. 7, 7a.—Fore-tibiae, male and female, *yorkensis*.

Figs. 8, 8a.—Fore-tibiae, male and female, *howitti*.

Figs. 9, 9a.—Male genitalia, *howitti*.

Figs. 10, 10a.—Male genitalia, *pseudotasmaniae*.

Head very broad, clypeus strongly reflected anterolaterally, clypeal suture of male (in specimen examined) apparently deeply arcuate in its median part. Lateral raised areas on suture as well-developed as in *howitti*.

Pronotum of male very large, and so strongly convex as to obscure portion of lateral margins when viewed from above. (Text-fig. 1.)

Fore tibia somewhat curved, and with the margins between the teeth smooth. Fore tarsus with apical segment shorter than preceding two together (Text-figs. 7, 7a; cf. Text-figs. 8, 8a).

Ventral surface more densely haired than in *howitti*. The sizes of the specimens before me are as follows:

Male.—Length, 10.8 mm.; breadth, 4.8 mm.

Female.—Length 8.9 mm., breadth 3.8 mm.

Note.—Mr. E. B. Britton, of the British Museum, has kindly examined the type of this species. He describes the colour as being a uniform cherry red, and confirms the smoothness of the fore-tibial outline between the teeth, the fore-tibial curvature or anterior concavity, and the male pronotal characters. Mr. Britton's letter is dated 6th July, 1948.

APHODIUS PSEUDOTASMANIAE, n. sp.

This species has been long known as *A. tasmaniae* in error. An analysis of the confusion which has given rise to this error appears earlier in this paper, under *A. howitti*.

Very close to *A. howitti*, but differing in being devoid of tubercles on the head, having conspicuous rows of hairs on the elytra of the male, and in details of the male genital terminalia.

Material examined:

Holotype male, collected by Key, Kerr and Carne, 11 m. S.E. of Waddamana, Tasmania, January, 1948. *Allotype* female, collected by Mr. J. R. Cunningham, Kingston, Tasmania, February, 1948; C.S.I.R.O. Collection, Canberra.

Two *paratype* males, three *paratype* females, collected by J. R. Cunningham, Kingston, Tasmania, February, 1948; pair in collection of Entomology Division, Dept. S. & I.R., New Zealand; male and two females in collection of Dept. of Agriculture, Hobart, Tasmania.

Paratype male, *paratype* female collected by E. Nye, Glenora, Tasmania, February, 1939; Collection F. E. Wilson, Melbourne.

Paratype male, *paratype* female, collected by J. W. Evans, Glenelg, Gretna, Tasmania, emerged 2.2.39 (reared?); collection of Dept. of Agriculture, Hobart.

Two *paratype* females, collected by J. W. Evans, Glenelg, Gretna, Tasmania, emerged 2.2.39 (reared?), one *paratype* male, five *paratype* females, collected by Messrs. Key, Kerr and Carne at Broadmarsh, Bothwell, Scamander, and Waddamana in Tasmania, January, 1948; C.S.I.R.O. Collection, Canberra.

SUMMARY.

On evidence submitted by Mr. E. B. Britton of the British Museum and others, the species *tasmaniae* Hope is herein reduced to synonymy under the species *howitti* Hope. Material from Tasmania, previously considered to be *tasmaniae*, is described as a new species, *pseudotasmaniae*. The species *andersoni* Blackburn is also reduced to synonymy under *howitti* Hope, and *yorkensis* Blackburn retains its status.

Acknowledgments.

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